British Columbia Coal Development

SEPTEMBER 1981

Province of British Columbia
Ministry of Industry and
Small Business Development

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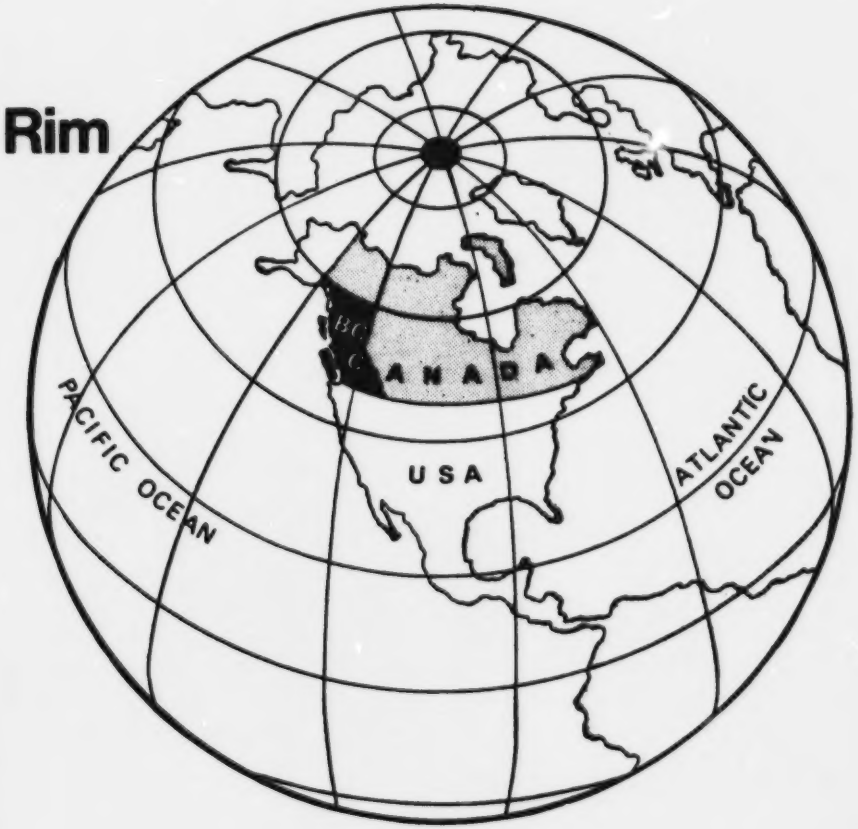
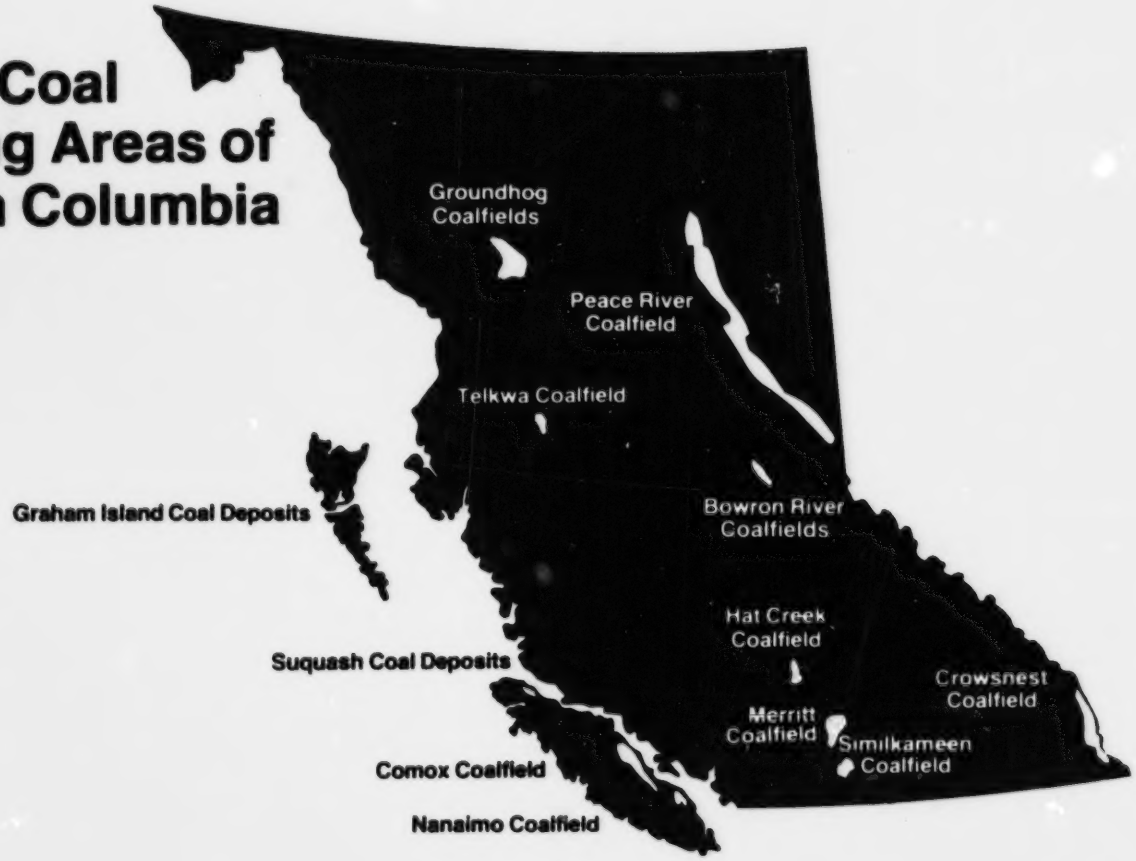
I. Introduction to British Columbia And Its Coal

British Columbia

Canada's Pacific Rim Province



Major Coal Bearing Areas of British Columbia



British Columbia Coal Resources (MT)[1]

	Metallurgical	Thermal	Total
Measured Reserves	1519	1289	2808
Resources	28372	7051	35423

MT = Million Tonnes

Metallurgical Coal Reserves are located in the Peace River and Crowsnest Coalfields.

Thermal Coal is found in all of the coal deposits in the Province.

[1] May 1981 estimates

II. Government Objectives and Policies

Government Jurisdictions

The Constitution assigns powers to both the Provincial and Federal Governments.

BRITISH COLUMBIA

- Fiscal Policy
- Industrial Development
- Resource Development
- Provincial Transportation
- Social Services
- Environment

CANADA

- Monetary and Fiscal Policy
- Trade
- Manpower and Immigration
- National Transportation
- Foreign Investment
- Environment

Provincial Economic Objectives

The Provincial economic strategy sets the following objectives;

- Full productive employment
- Growth in real incomes
- Stability of employment, incomes, and prices
- Protection of environment
- More balanced regional development

Coal Policy Objectives

British Columbia coal policy sets the following objectives:

- Maximize the economic and social benefits to British Columbia and Canada from coal development.
- Promote energy security for B.C.
- Provide a healthy investment climate which is attractive to coal development.

Coal Policy Elements

The coal policy has 8 major elements:

1. Marketing/Promotion
2. Export Policy
3. Taxation
4. Tenure
5. Support Facilities
6. Research and Development
7. Environment and Land Use Assessment
8. Socio-Economic Assessment

1. Government Marketing/Promotion Activities

British Columbia sponsors:

- Market Analysis
- Trade Missions
- Technical Missions
- Office of the British Columbia Coal Coordinator

2. Provincial Export Policy

Coal may be exported if:

- B.C.'s long-term domestic requirements are secure
- Canada's long-term domestic requirements are secure

3. Provincial and Federal Taxation

• Income Tax — Federal Corporation Tax	36% Taxable Income[1]
— Provincial Corporation Tax	15% Taxable Income
— Mining Tax (Provincial)	15% Net Income
• Surtax — Federal	5% Taxable Income
• Royalty — Provincial	3.5% Minehead Value
• Corporation Capital Tax — Provincial	.2% Taxable Paid-Up Capital
• Mineral Land Tax — Provincial	Per Acre Levy on Freehold Properties (Equal to Royalty)

[1] Gross Tax Rate Before Resource Allowance

4. Coal Property Tenures

- Issued on first come first served basis by Ministry of Energy, Mines and Petroleum Resources

- Types of Tenure

  - License
    - — Issued for Exploration
    - — Renewable 1 year terms
    - — Rental fee applies
    - — Work obligations

  - Lease
    - — Issued for production
    - — 21 year term/renewable
    - — Royalty applies
    - — Production obligations

  - Holding license
    - — Production uneconomic
    - — 5 year terms
    - — Rental fee applies
    - — Avoids work obligations

cont'd

- Limited production permit
  - — May be granted to license holder
  - — Royalty applies
- Freehold coal rights
  - — Historical land ownership
  - — Mineral land tax applies

5. Provincial Research And Development Activities:

British Columbia provides:

- Evaluation of coal technology developments
- Coordination and cost sharing of coal research activities in the province, with industry and with other governments.
- Recommendations on specific coal research and development proposals for government funding in the following areas:

— Resource evaluation
— Mining
— Preparation
— Transportation
— Utilization
— Conversion
— Environmental protection

6. Provincial Investment In Support Facilities

- The Province may invest in the following support facilities:
  - —Railways
  - —Roads
  - —Townsites
  - —Power
  - —Ports

- Financial assistance will only be provided where net benefits to the Province and Canada and financial need by the mining company are demonstrated.

7. Environment And Land Use Assessment

- The objective is to plan for optimal land use
- The vehicle for the assessment of new mine proposals is the Guidelines for Coal Development
- The considerations include

— Fish & Wildlife
— Acquatics and Vegetation
— Soil, Water and Air Quality

8. Socio-economic Assessment

- The objective is to enhance the quality of life
- The vehicle for the assessment of new mine proposals is the Guidelines for Coal Development
- The considerations include:
  - — Human resources impacts
  - — Community impacts
  - — Regional impacts
  - — Support facilities requirements
- The policy directions are to:
  - — Promote local recruitment and hiring
  - — Ensure use of existing communities when feasible
  - — Provide assistance to communities experiencing rapid growth
  - — Encourage regional balance
  - — Minimize negative impacts on existing residents

III. Coal Development by Region

The South East

Coalfields
— Crowsnest

Crowsnest Coalfield

Coal Resources (MT)[1]

	Metallurgical	Thermal	Total
Measured Reserves	1233	218	1451
Resources	21495	3793	25288

MT = Million Tonnes

[1] May 1981 estimates

Status of Development

Crowsnest Coalfield

LEGEND
- Existing Roads
- Proposed Roads
- Existing Railways
- Proposed Railways
- O Existing Mines
- □ Proposed Mines
- ■ New Mines Under Construction
- ● Existing Communities

Coal Production Potential (MTPY Clean Coal)

	Production			
	Metallurgical	Thermal	Total	Method
Operating Mines		Capacity (1980)		
Balmer	6.3	.1	6.4	OP/UG
Fording	3.4	0.0	3.4	OP
Byron Creek	0.0	1.2	1.2	OP
Sub-Total	9.7	1.3	11.0	
Under Construction		Capacity		
Fording Expansion	2.0	.2	2.2	OP
Line Creek	1.3	1.4	2.7	OP
Greenhills	1.8	0.0	1.8	OP
Sub-Total	5.1	1.6	6.7	
Proposed		Capacity		
Sage Creek	0.0	2.0	2.0	OP
Balmer Expansion	1.0	0.0	1.0	UG
Elk River	4.0	0.0	4.0	OP
Corbin Creek	0.0	.4	.4	OP
Hosmer-Wheeler	2.0	0.0	2.0	UG
Byron Creek Expansion	0.0	2.4	2.4	OP
Sub-Total	7.0	4.9	11.8	
Grand Total	21.8	7.7	29.5	

OP=Open Pit UG=Underground MTPY=Million Tonnes Per Year

Crowsnest Coalfield

Mine Operators / Developers & Owners

Mine	Operator/Developer	Owner
Balmer	B.C. Coal	B.C. Coal
Fording	Fording Coal	Canadian Pacific Enterprises/Cominco
Byron Creek	Byron Creek Collieries	Esso Resources Canada
Line Creek	Crows Nest Industries	Shell Canada
Greenhills	B.C. Coal	B.C. Coal
Sage Creek	Sage Creek Coal	Rio Algom / Pan Ocean
Elk River	Elco	European Consortium/Stelco /Home Oil/Scurry Rainbow
Corbin Creek	Crows Nest Industries	Shell Canada
Hosmer-Wheeler	B.C. Coal	B.C. Coal

Crowsnest Coalfield

Operating Manpower Requirements

Operating Mines	Employment
Balmer	2200
Fording	1430
Byron Creek	110
Total	3710
Under Construction	**Expected Employment**
Fording Expansion	200
Line Creek	440
Greenhills	840
Total	1480
Proposed Mines	**Expected Employment**
Sage Creek	400
Balmer Expansion	200
Elk River	1350
Corbin Creek	80
Hosmer-Wheeler	760
Byron Creek Expansion	270
Total	2860

Crowsnest Coalfield

Community Development

Operating Mines and Under Construction	Community
• Balmer	Sparwood / Fernie
• Fording	Elkford
• Byron Creek	Sparwood
• Line Creek	Sparwood / Elkford
• Greenhills	Elkford
Proposed Mines	
• Sage Creek	Fernie
• Elk River	Elkford / Hostel
• Corbin Creek	Sparwood / Fernie
• Hosmer-Wheeler	Fernie / Sparwood

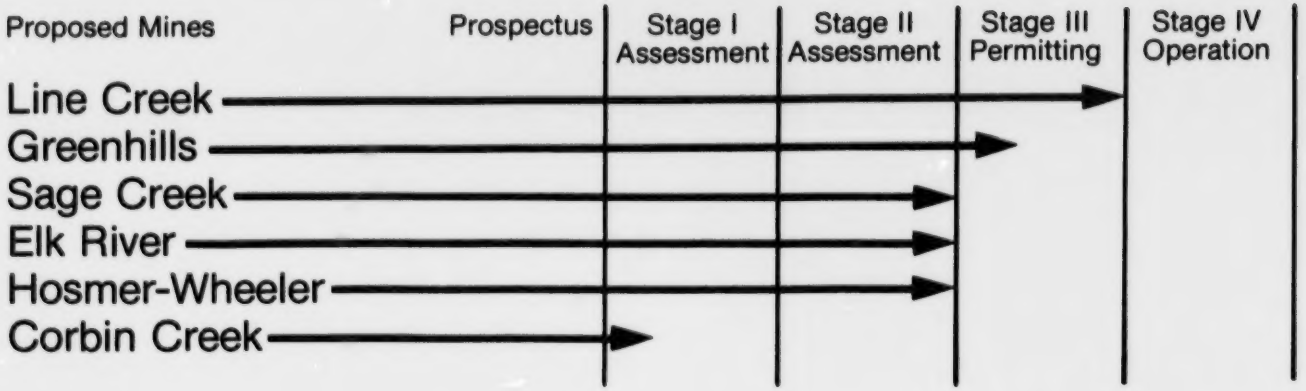
Crowsnest Coalfield

Distance to Tidewater

Operating Mines	Port	Access via	Distance (km)
Balmer	Roberts Bank	Rail (C.P.)	1116
Fording	Roberts Bank	Rail (C.P.)	1168
Byron Creek	Pacific Coast Term. Thunder Bay	Rail (C.P.) Rail	1125 2200
Under Construction			
Line Creek	Roberts Bank	Rail (C.P.)	1135
Kaiser (Greenhills)	Roberts Bank	Rail (C.P.)	1168
Proposed			
Sage Creek	Roberts Bank	Rail (C.P.)	1205
Elk River	Roberts Bank Thunder Bay	Rail (C.P.) Rail	1192 2200
Corbin Creek	Roberts Bank	Rail (C.P.)	1125
Hosmer-Wheeler	Roberts Bank	Rail (C.P.)	1104

Crowsnest Coalfield

Progress Through Coal Guidelines



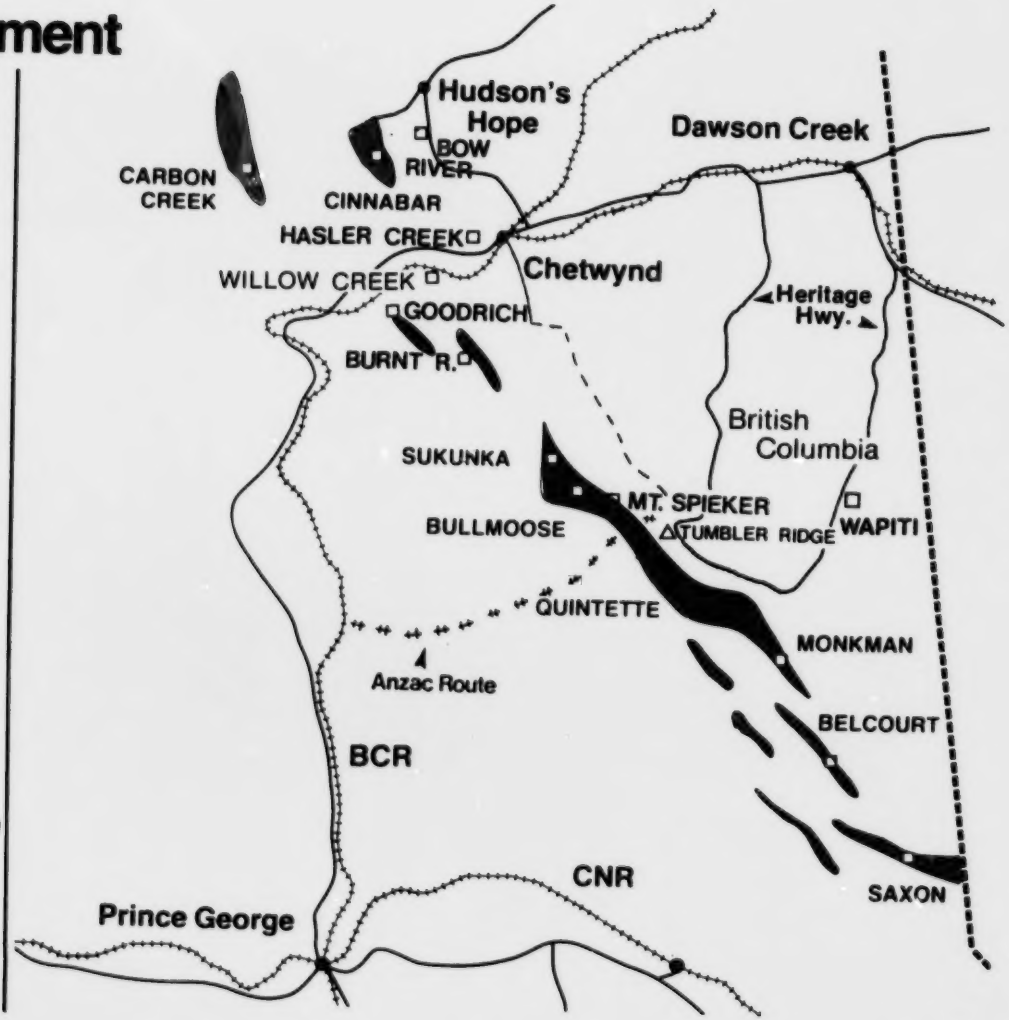
The North East

Coalfields:
— Peace River

Status of Development

Peace River Coalfield

- Existing Roads
- Roads Under Construction
- Existing Railways
- Railways Under Construction
- ● Existing Communities
- ■ Mines Under Construction
- △ New Communities
- □ Proposed Mines



Peace River Coalfield

Coal Resources (MT)[1]

	Metallurgical	Thermal	Total
Measured Reserves	286	50	336
Resources	6877	1214	8091

MT = Million Tonnes

[1] May 1981 estimates

Peace River Coalfield

Coal Production Potential (MTPY Clean Coal)

Mines Under Construction	Metallurgical	Thermal	Total	Method
		Capacity		
Quintette*	5.0	1.0	6.0	OP
Bullmoose*	1.7	0.0	1.7	OP
Sub-Total	6.7	1.0	7.7	
Proposed Mines				
Sukunka	3.0	0.0	3.0	UG
Monkman	3.3	1.0	4.3	OP
Burnt River	0.0	1.0	1.0	OP
Mt. Spieker	1.0	0.0	1.0	OP/UG
Carbon Creek	0.0	2.0	2.0	OP/UG
Cinnabar	0.0	2.0	2.0	OP/UG
Belcourt	4.0	0.0	4.0	OP/UG
Saxon	4.0	0.0	4.0	OP/UG
Bow River	0.0	1.35	1.35	UG
Hasler Creek	0.5	0.0	0.5	N/A
Goodrich	N/A	N/A	N/A	N/A
Willow Creek	0.0	0.6	0.6	UG
Wapiti	0.0	1.0	1.0	OP
Sub-Total	15.8	8.95	24.75	
Grand Total	22.5	9.95	32.45	

OP = Open Pit UG = Underground N/A = Not Available MTPY = Million Tonnes Per Year

* In-Service Date 1983

Peace River Coalfield

Mine Operators / Developers & Owners

Mine	Operator/Developer	Owner
Quintette	Quintette Coal Ltd.	Denison Mines & Partners
Bullmoose	Teck Corp	Teck Corp
Sukunka	B.P. Canada	B.P. Ltd.
Monkman	Petro-Canada	Petro-Canada
Burnt River	Teck Corp	Teck Corp
Mount Spieker	Ranger Oil	Ranger Oil Ltd.
Carbon Creek	Utah Mines	Utah Mines
Belcourt	Gulf Oil & Denison Mines	Gulf Oil & Denison Mines
Saxon	Denison Mines	Denison Mines
Cinnabar	Cinnabar Peak Mines	Cinnabar Peak Mines
Bow River	Utah Mines	Utah Mines
Hasler Creek	Pan Ocean	Pan Ocean
Goodrich	Gulf Oil Canada	Gulf Oil Canada
Willow Creek	Semper Resources	Semper Resources

Peace River Coalfield

Operating Manpower Requirements

Mines Under Construction	Employment
Quintette	1540
Bullmoose	500
Total	2040
Proposed Mines	
Sukunka	1200
Monkman	860
Burnt River	225
Mt. Spieker	525
Carbon Creek	875
Cinnabar	375
Belcourt	1400
Saxon	1600
Bow River	N/A
Hasler Creek	N/A
Goodrich	N/A
Willow Creek	60
Total	7490+

N/A = Not Available

Peace River Coalfield

Community Development

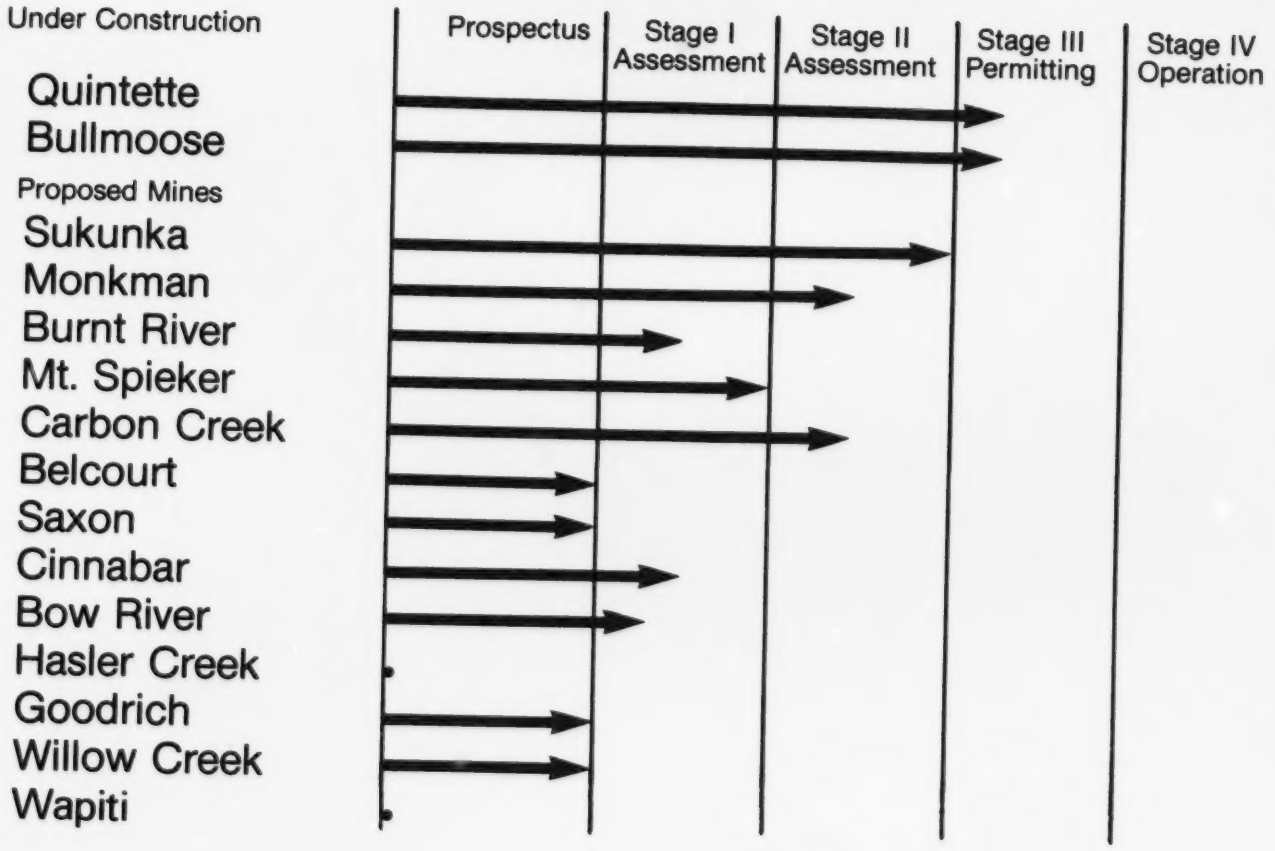
Mines Under Construction	Community
Quintette	Tumbler Ridge
Bullmoose	Tumbler Ridge
Proposed Mines	
Sukunka	Chetwynd
Monkman	Tumbler Ridge
Burnt River	Chetwynd
Mt. Spieker	Tumbler Ridge
Carbon Creek	Hudson's Hope
Cinnabar	Hudson's Hope/Chetwynd
Belcourt	New Town
Saxon	New Town
Bow River	Hudson's Hope/Chetwynd
Hasler Creek	Hudson's Hope/Chetwynd
Goodrich	Chetwynd
Willow Creek	Chetwynd
Wapiti	Dawson Creek/Tumbler Ridge

Peace River Coalfield
Distance to Ports

Mines Under Construction	Port	Access Via	Distance (km)
Quintette	Ridley Island	Rail (B.C.R./C.N.R.) via Anzac	994
Bullmoose	Ridley Island	Road/Rail (B.C.R./C.N.R.) via Anzac	1005
Proposed Mines			
Sukunka	Ridley Island	Rail (B.C.R./C.N.R.) via Chetwynd	1116
Monkman	Ridley Island	Rail (B.C.R./C.N.R.) via Anzac	1030
Burnt River	Ridley Island	Rail (B.C.R./C.N.R.) via Chetwynd	1075
Mt. Spieker	Ridley Island	Road/Rail (B.C.R./C.N.R.) via Anzac	1000
Carbon Creek	Ridley Island	Rail (B.C.R./C.N.R.) via Chetwynd	1200
Cinnabar	Ridley Island	Rail (B.C.R./C.N.R.) via Chetwynd	1160
Belcourt	Ridley Island	Rail (B.C.R./C.N.R.) via Anzac	1082
Saxon	Ridley Island	Rail (B.C.R./C.N.R.) via Anzac	1200
Bow River	Ridley Island	Rail (B.C.R./C.N.R.) via Chetwynd	1160
Hasler Creek	Ridley Island	Rail (B.C.R./C.N.R.) via Chetwynd	1056
Goodrich	Ridley Island	Rail (B.C.R./C.N.R.) via Chetwynd	1075
Willow Creek	Ridley Island	Rail (B.C.R./C.N.R.) via Chetwynd	1075

Peace River Coalfield

Progress Through Coal Guidelines



The Central Region

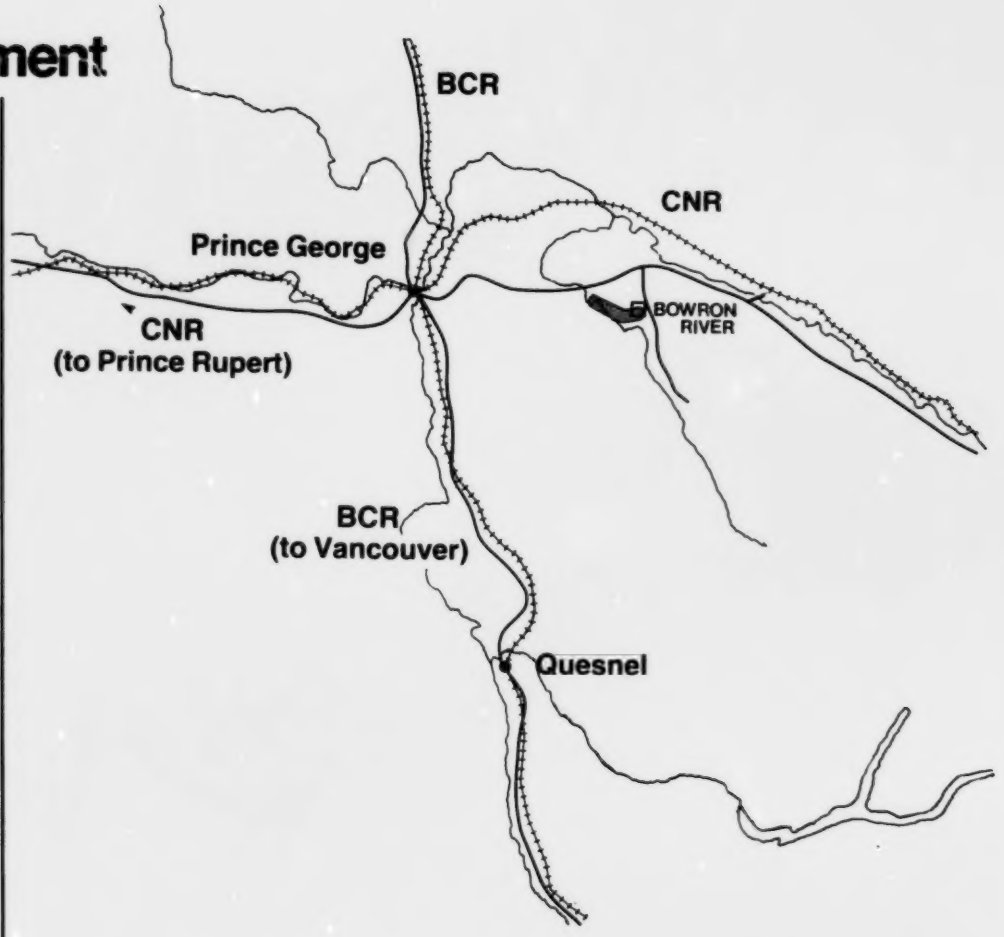
Coalfields

— Bowron River
— Hat Creek
— Merritt/Similkameen

Status of Development

Bowron River Coalfield

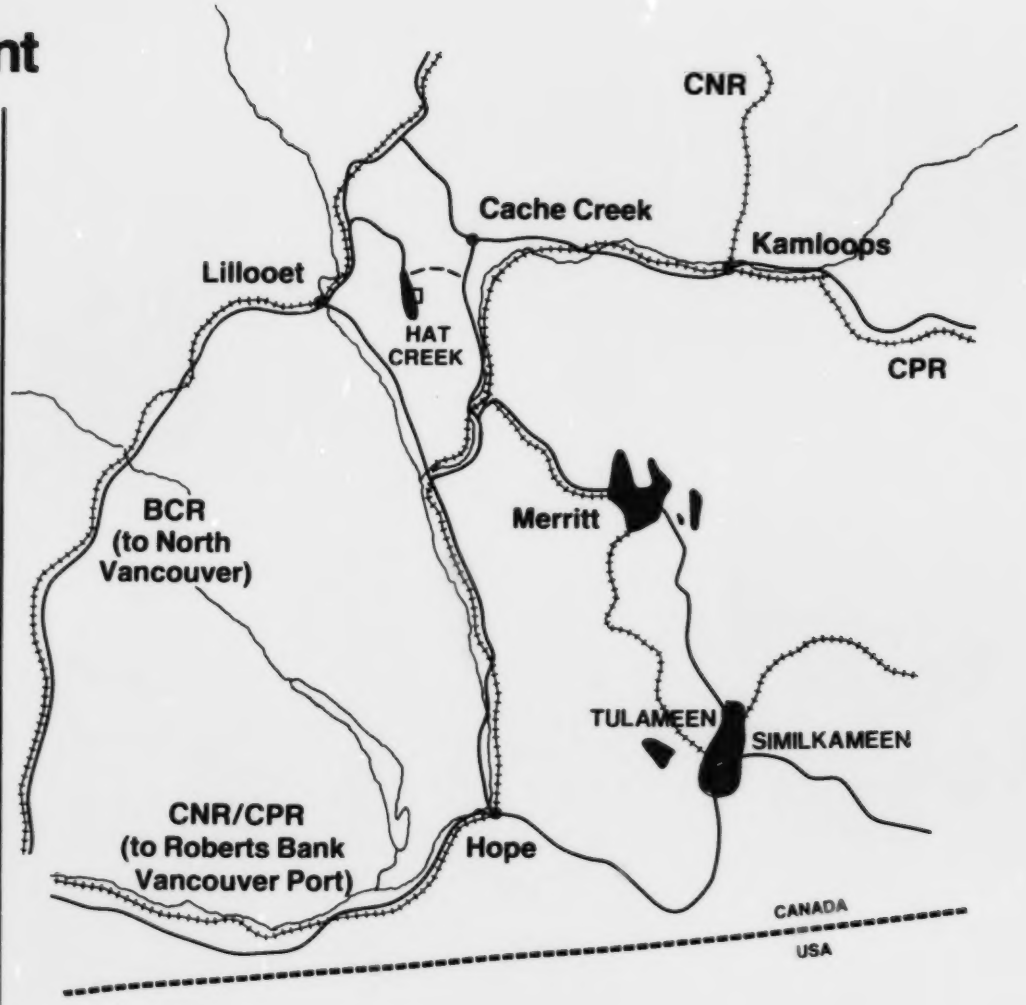
— Existing Roads
+++++ Existing Railways
• Existing Communities
□ Proposed Mines



Status of Development

Hat Creek
Merritt
Similkameen
Coalfields

— Existing Roads
+++++ Existing Railways
• Existing Communities
□ Proposed Mines
- - - Proposed Road



Central Coalfield

Coal Resources (MT)[1]

	Measured Reserves	Resources
Bowron River	6	160
Hat Creek	1000	1725
Merritt	N/A	8
Similkameen	N/A	21
Total	1006+	1914

MT = Million Tonnes
N/A = Not Available

All coal is thermal

[1] May 1981 estimates

Central Coalfields

Coal Production Potential (MTPY Clean Coal)

Proposed Mines	Thermal		Method
Bowron River	1.0		UG
Hat Creek	10.0	—to fuel power plant.	OP
	18.3	—additional potential for liquefaction plant.	
Total	29.3		
Potential Mine			
Tulameen	N/A		OP

OP=Open Pit UG=Underground MTPY=Million Tonnes Per Year

Central Coalfields

Mine Operators / Developers & Owners

Mine	Operator/Developer	Owner
Bowron River	Norco Resources	Norco Resources
Hat Creek	B.C. Hydro	B.C. Hydro
Tulameen	Cyprus - Anvil	Cyprus - Anvil

Central Coalfields

Manpower and Community Requirements

Proposed Mines	Expected Employment	Community
Bowron River	400	Prince George
Hat Creek	875—mine 285—power plant	Cache Creek/Ashcroft/ Lillooet
Total	1560	
Potential Mine		
Tulameen	N.A.	Tulameen

N.A.=Not Available

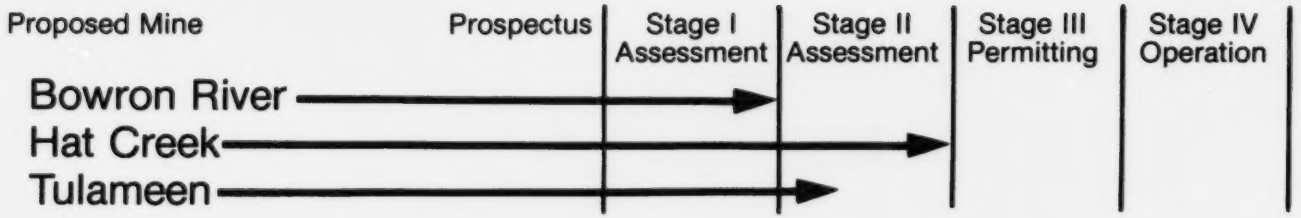
Central Coalfields

Distance to Ports

Proposed Mines	Port	Access Via	Distance (km)
Bowron River	Ridley Island	Rail (CNR)	780
	Roberts Bank	Rail (CNR)	850
Hat Creek	No Exports		
Potential Mine			
Tulameen	Roberts Bank	Rail (CNR)	400

Central Coalfield

Progress Through Coal Guidelines



The North West

Coalfields

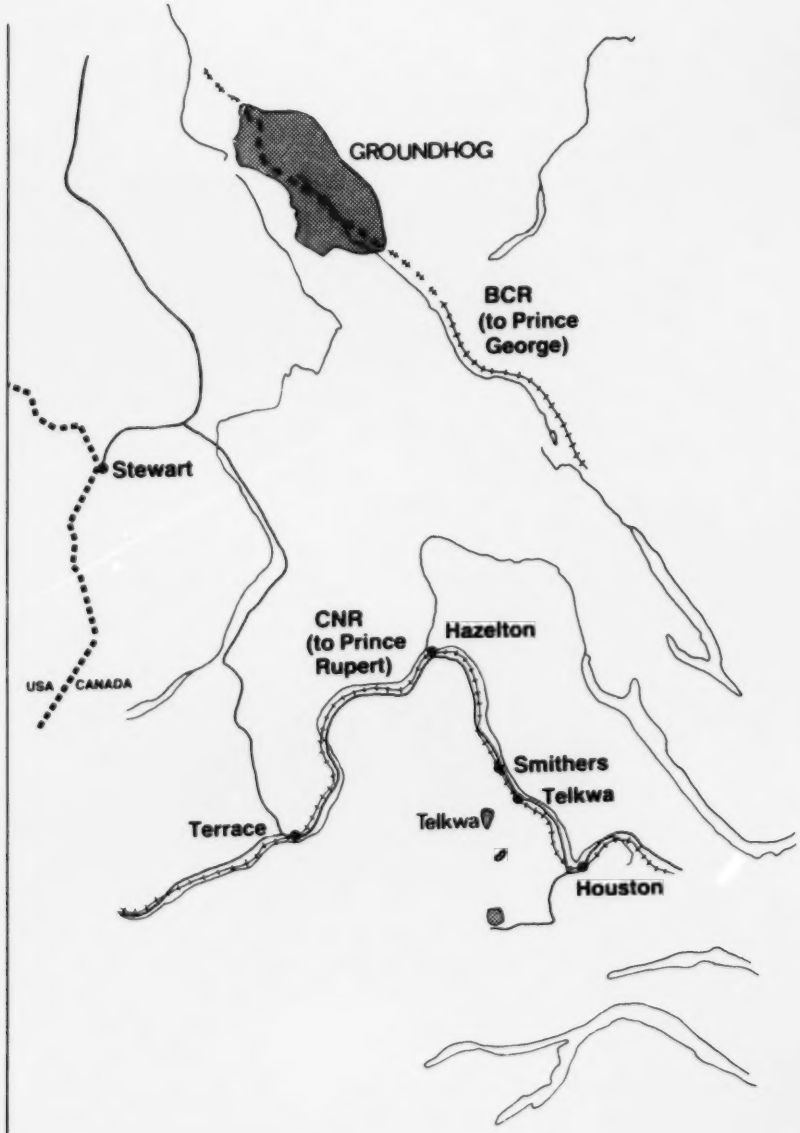
— Groundhog

— Telkwa

Status of Development

Groundhog Coalfield
Telkwa Coalfield

— Existing Roads
+++++ Existing Railways
-- -- Proposed Railways
• Existing Communities
□ Proposed Mines



North West Coalfields

Coal Resources (MT)[1]

	Measured Reserves	Resources
Groundhog	N/A	100
Telkwa	N/A	5
Total	N/A	105

MT = Million Tonnes
N/A = Not Available

All coal is thermal

[1] May 1981 estimates

North West Coalfields

Potential Coal Production

Potential	Thermal	Method
Groundhog	*	OP/UG
Telkwa	*	UG

* No developments are currently proposed.

North West Coalfields

Manpower and Community Impacts Requirements

No developments are currently proposed

North West Coalfields

Distance to Ports

Coal Deposit	Port	Access Via	Distance (km)
Groundhog	Ridley Island	Road/Rail	1300
Telkwa	Ridley Island	Rail (CNR)	850

North West Coalfields

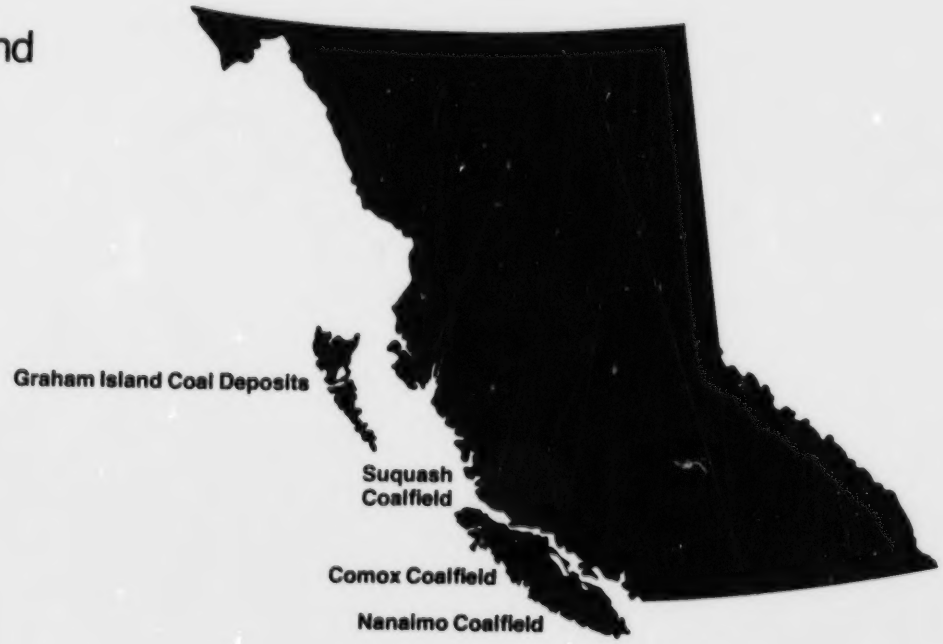
Progress Through Coal Guidelines

No developments are currently proposed

The Coast

Coalfields

— Graham Island
— Suquash
— Comox
— Nanaimo

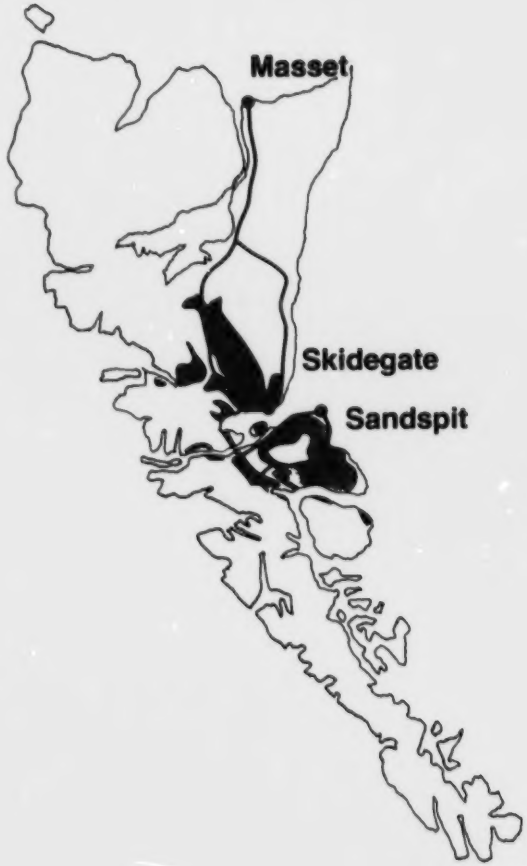


Status of Development

Graham Island Coalfield

— Existing Roads

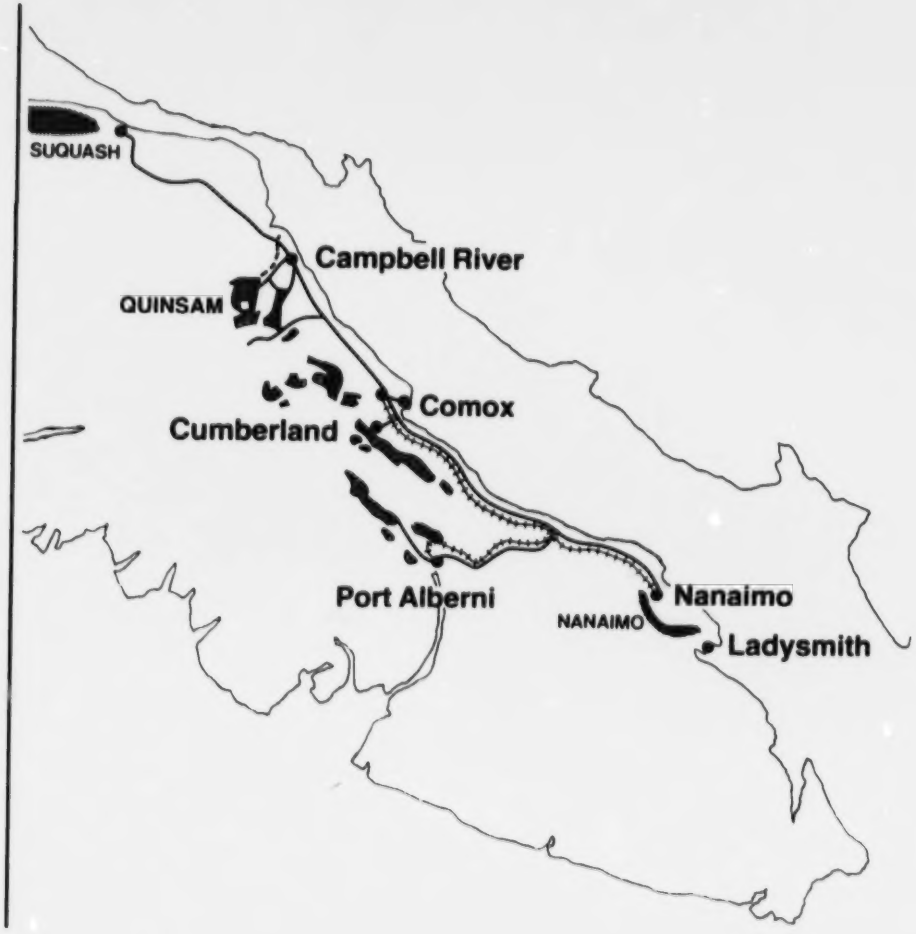
• Existing Communities



Status of Development

Nanaimo, Comox and
Suquash Coalfields:

Existing Roads
Existing Railways
Existing Communities
Proposed Mines
Proposed Roads



Coastal Coalfield

Coal Resources (MT)[1]

	Measured	Reserves	Resources
Graham Island		N/A	N/A
Suquash		N/A	N/A
Comox		15	18
Nanaimo		N/A	7
Total		15+	25+

MT = Million Tonnes
N/A = Not Available

All coal is thermal

[1] May 1981 estimates

Coastal Coalfields

Coal Production Potential (MTPY Clean Coal)

Proposed	Thermal	Method
Quinsam	0.9	OP

OP=Open Pit MTPY=Million Tonnes Per Year

Coastal Coalfields

Mine Operators / Developers & Owners

Mine	Operator/Developer	Owner
Quinsam	Quinsam Coal Ltd.	Weldwood / Brinco Mining Ltd.

Coastal Coalfields

Manpower and Community Requirements

Proposed	Manpower	Community
Quinsam	240	Campbell River

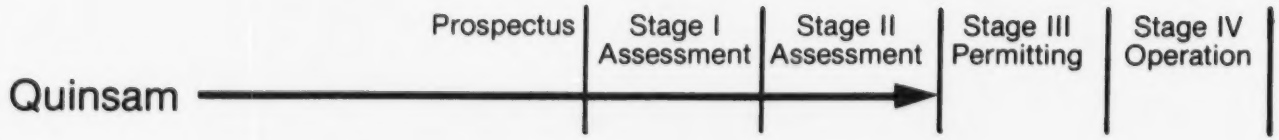
Coastal Coalfields

Distance to Tidewater

Proposed Mine	Access Via	Distance (km)
Quinsam	Road	16-30
Coal Deposits		
Graham Island	Road	16
Suquash	Road	0-4
Nanaimo	Road	3-20

Coastal Coalfields

Progress Through Coal Guidelines

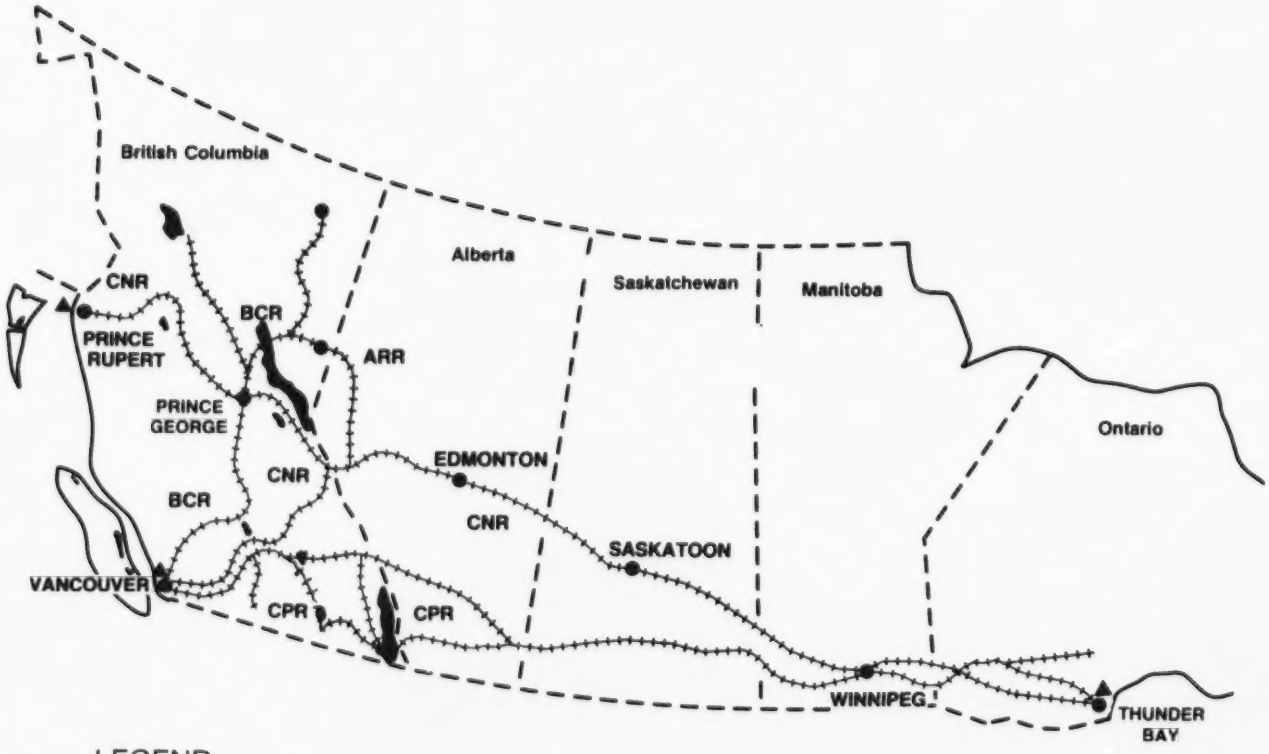


IV. Transportation System

- Road
- Rail
- Port

An extensive transportation network is now in place and continues to be enhanced to facilitate the movement of coal to market.

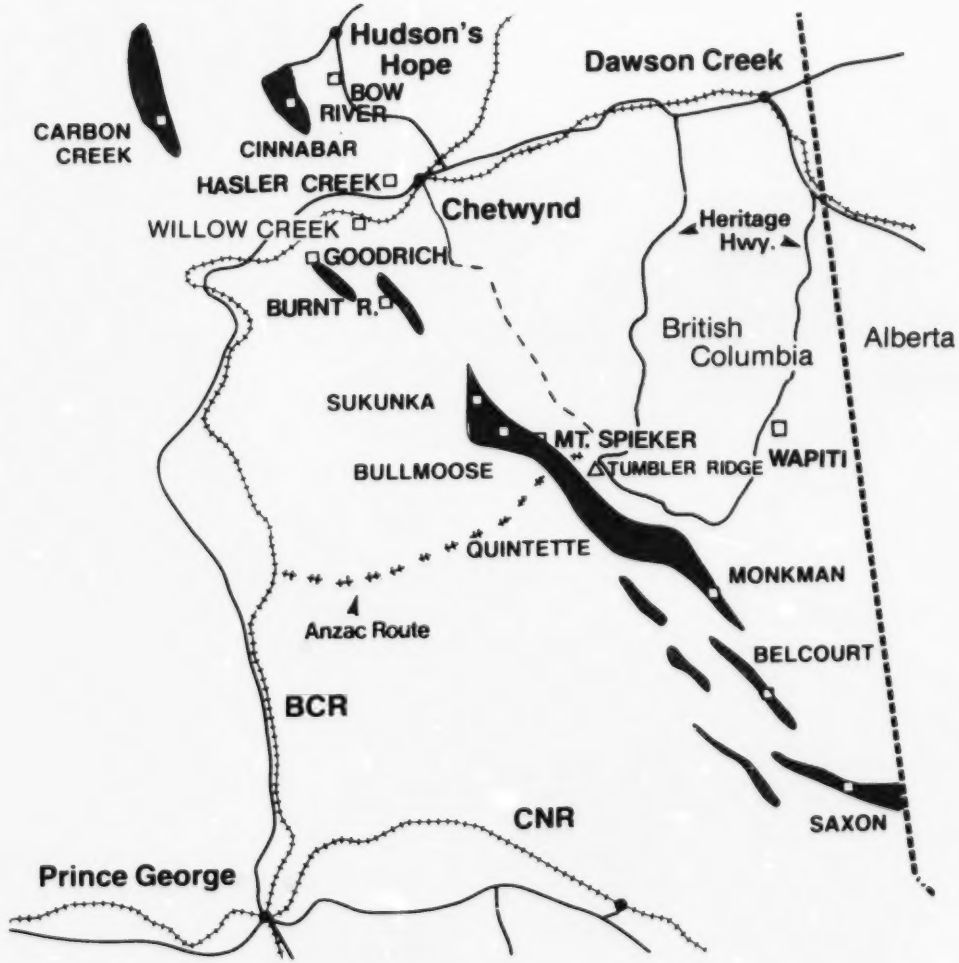
Existing
Rail Routes from Coal Deposits to Ports



Crowsnest Coalfield
Rail /Road Network

LEGEND
- Existing Roads
- Proposed Roads
- Existing Railways
- Proposed Railways
- Existing Mines
- Proposed Mines
- New Mines Under Construction
- Existing Communities

Peace River Coalfield
Rail /Road Network



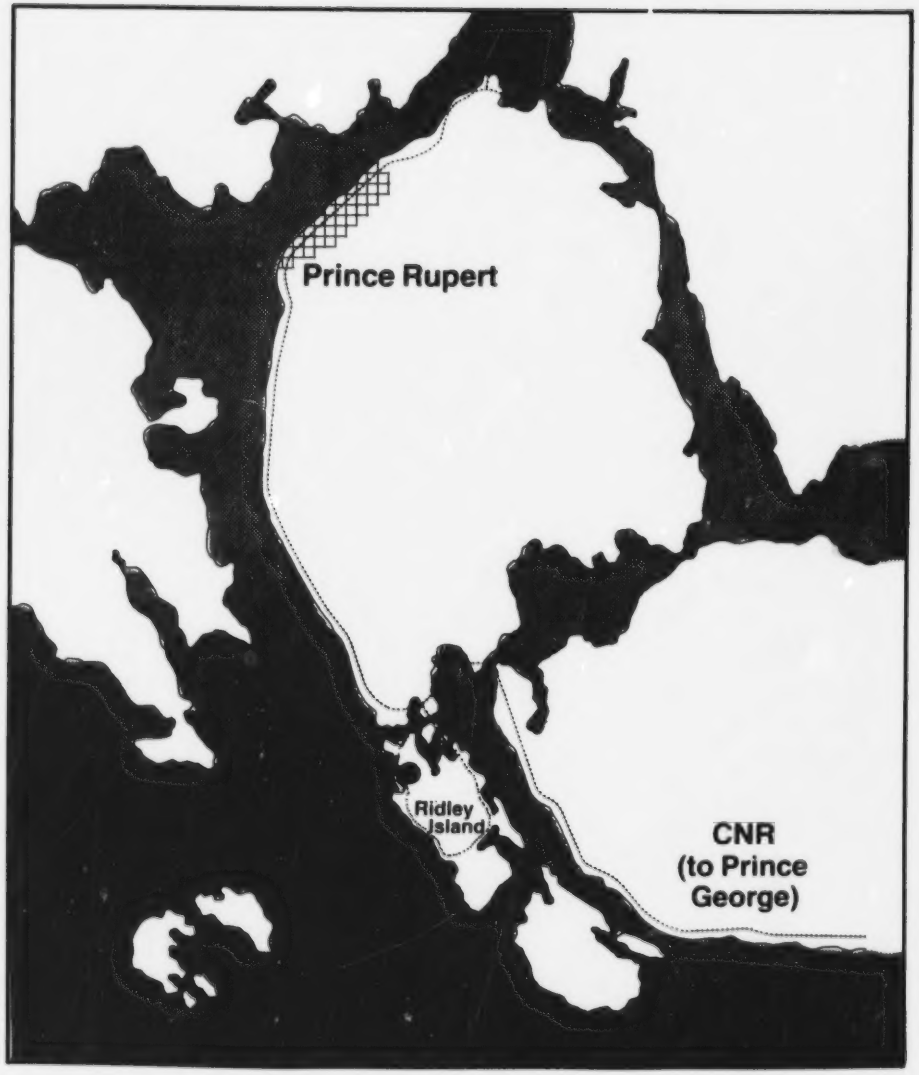
LEGEND
- Existing Roads
- Roads Under Construction
- Existing Railways
- Railways Under Construction
- Existing Communities
- New Communities
- Proposed Mines
- Mines Under Construction

Ports

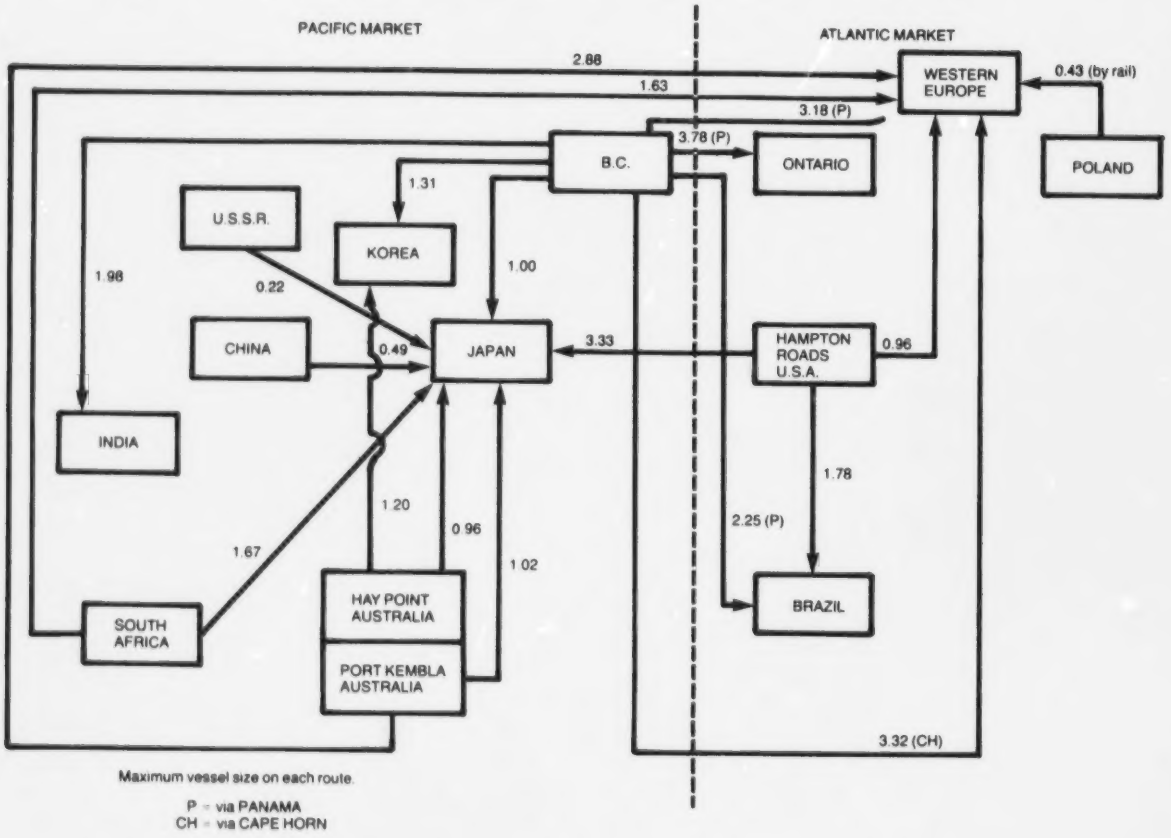
Existing Terminals	Throughput Capacity (MTPY)
Neptune Terminals	6.0
Pacific Coast Terminals	2.0
Westshore Terminals (at Roberts Bank)	10.0
Under Construction	
Roberts Bank	18.0
Prince Rupert	12.0
Potential Terminal	
Roberts Bank	10.0-15.0

MTPY = Million Tonnes per Year

Ridley Island Site of New Coal Terminal



Relative World Shipping Costs (British Columbia to Japan = 1.00)



V. World Coal Markets

Destinations of British Columbia Coal in 1980[1]

	Thermal % Total	Metallurgical % Total
Domestic	67	0
Japan	8	80
Korea	0	10
Europe	25	4
Other Pacific Rim & Latin America	0	6
Total Shipments	1.2 MT	9.6 MT

MT = Million Tonnes

[1] Estimated

Projected World Imports of Metallurgical Coal (MT)

	1980			1985			1990		
Region	Steel	Coal Demand	Imports	Steel	Coal Demand	Imports	Steel	Coal Demand	Imports
W. Europe	196	119	30	210	122	39	230	125	42
E. Europe									
-Yugoslavia	8	4	4	10	5	5	10	5	5
-Romania	16	9	4	23	13	4	27	15	5
Canada	16	8	8	21	10	10	25	12	12
Latin America	29	13	8	49	24	15	74	36	22
Asia									
-Japan	107	72	65	125	86	80	135	92	86
-Korea	6	4	4	11	7	7	15	10	10
-India	13	16	1	16	21	3	22	30	5
-Taiwan	3	2	1	4	3	3	7	5	5
Other	12	7	3	20	12	4	30	18	6
World	406	254	128	489	303	170	575	348	198

MT = Million Tonnes

Projected Japanese Metallurgical Demand and Supply Sources (MT)

	1980	1985	1990
Demand	72	86	92
Domestic Supply	7	6	6
Import Sources:			
USA	21	14	10
Australia	26	35.5	38.5
Canada	11	21.5	25.5
USSR	2	4	4
China	1	2	4
S. Africa	3	2	2
Poland & Others	1	1	2
Total Imports	65	80	86

MT = Million Tonnes

NOTE: 1980 Figures are actual fiscal 1980 shipments

World Markets for Western Canadian Metallurgical Coal (MT)

Country	1980	1985	1990
Japan	10.0	22.0	26.0
Korea	1.0	2.0	3.0
Other Asia	.5	2.0	3.0
Latin America	.6	1.0	2.0
Europe	1.0	2.0	4.0
E. Canada	.3	.3	1.5
Total	13.4	29.3	39.5

MT = Million Tonnes

World Metallurgical Coal Trade in 1990 (MT)

Import Demand		Export Potential	
W. Europe	42	U.S.A.	75
E. Europe	10	Australia	60
Canada	12	Canada	34
Latin America	22	U.S.S.R.	10
Asia	106	Poland	10
Others	6	S. Africa	3
		Others	6
Total	198		198

MT = Million Tonnes

Import Markets for Thermal Coal, Selected Countries (MT)

Region	1980	1985	1990
W. Europe	35	60	103+
Asia:			
-Japan	5	22	53+
-Korea	1	8	13+
-Hong Kong	0	4	9+
Totals	41	94	178+

MT = Million Tonnes

For Further Information

Subject	Contact
Coal Resource Tenure, Policy, Coal Guidelines Process	Ministry of Energy, Mines and Petroleum Resources
Environment	Ministry of Environment
Policy, Economics, Markets, Production, Finances, General Development Plans	Ministry of Industry and Small Business Development
Manpower	Ministry of Labour
Community Development	Ministry of Municipal Affairs
Rail, Road and Port Systems	Ministry of Transportation and Highways
Industry-Government Liaison	Office of the B.C. Coal Coordinator